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14. ABSTRACT This paper assesses the role of intuition in Carl von Clausewitz's description of "military genius" in On War. Specifically, it addresses the cognitive biases discovered and articulated by cognitive psychologists to determine how failures of human intuition preclude clear thinking and hinder military decision making. The purpose of this paper is to add some measure of clarity based on the research of scientists and psychologists to help inform readers of how decisions are made and the cognitive errors that prevent military decision-makers from making the best possible decision given the information available at the time.					
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**Carl von Clausewitz's Concept of "Military Genius"
and the Cognitive Illusions that Preclude Clear Thinking**

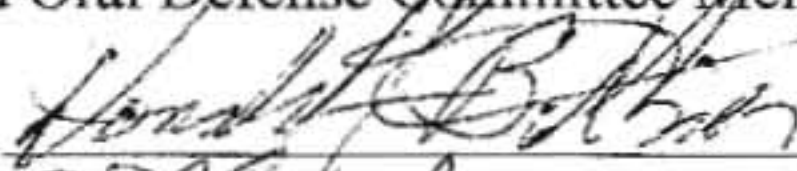
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Executive Summary

Title: Carl von Clausewitz's Concept of "Military Genius" and the Cognitive Illusions that Preclude Clear Thinking

Author: Major Mark Nicholson, United States Marine Corps

Thesis: Recent research conducted in the field of psychology offers useful insights into human cognition and decision making that build upon Carl von Clausewitz's concept of "military genius" and provide a perspective rooted in scientific study that challenges normative views of how military leaders think about problems and make decisions.

Discussion: Carl von Clausewitz's concept of "military genius" is a remarkable and thorough analysis of the qualities required of successful senior military leaders. The qualities and traits Clausewitz offers of a military genius are useful in application for military leaders at multiple levels. Although his treatment of the subject is robust, one should not consider it to be a definitive and all-encompassing study of the characteristics that allow military commanders to make the best possible decisions in a given set of circumstances.

Cognitive psychologists have conducted research and developed theories that not only show a greater understanding of how people perceive their environments, but also the cognitive limitations of human perception and decision making. This study, focused on *cognitive biases* and *illusions*, illustrates how people overestimate their abilities in areas such as *attention*, *memory*, *confidence*, *knowledge*, and *understanding causation*. Recognizing these limitations and their root causes can help military professionals better understand how to render judgments and make decisions.

This study also seeks to analyze and challenge Clausewitz's ideas regarding the utility of relying on intuition and *coup d'oeil* in uncertain environments and, particularly, in conflict against a thinking and inherently unpredictable enemy.

Conclusion: Military leaders should seek to evaluate, challenge, and incorporate scientific research into their existing beliefs regarding cognition and decision making to supplement perspectives of renowned military theorists like Carl von Clausewitz. This effort will help military professionals develop a more robust appreciation for the cognitive processes that preclude clear thinking and effective decision making.

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Preface

Like most U.S. Marine second lieutenants, I was first introduced to Carl von Clausewitz's ideas and theories for the first time at The Basic School in Quantico, Virginia. My knowledge of the military and war was extremely shallow, and I struggled to grasp the importance of the seemingly endless quotations and passages taken from Clausewitz's *On War*. Over the following eight years after leaving TBS, I continued to see his ideas surface in a number of scholarly journals and various briefs while serving in the operating forces. While attending the Marine Corps' Expeditionary Warfare School (EWS) as a senior captain, I had the opportunity to read passages from *On War* again and have more in-depth discussions about his ideas and how they relate to the profession of arms. In the time that had passed between TBS and EWS, I slowly began to understand that Clausewitz had far more to offer than I realized as a young lieutenant.

At the Marine Corps' Command and Staff College, I was again challenged to think more about Clausewitz and his ideas. In particular, his discussion of the concept of "military genius" caught my attention. In reading about the subject, it occurred to me that although few commanders will fall within the scope of Clausewitz's definition of "military genius," his discussions about how we as military professionals make decisions is still very relevant to all of us. While my understanding of Clausewitz's ideas is still growing, and I have had no formal education in cognitive psychology, I am interested in where these two areas intersect and what they can offer in broadening my understanding of how we as leaders and commanders can make better decisions. This paper marks my first steps on that intellectual journey.

Special thanks go to Dr. Bittner for his help in guiding me through this process. His unique insights, mentorship, and constructive input were invaluable to the completion of this project. Most importantly, thanks to my wife Michelle for her undeserved patience and willingness to assume the preponderance of my responsibilities as a parent in taking care of the needs of our newborn daughter and two other young children during the writing of this thesis.

The Mental Landscape of Uncertainty

"Since all information and assumptions are open to doubt, and with chance at work everywhere, the commander continually finds that things are not as he expected. This is bound to influence his plans, or at least the assumptions underlying them. If this influence is sufficiently powerful to cause a change in his plans, he must usually work out new ones; but for these the necessary information may not be immediately available. During an operation decisions have usually to be made at once: there may be no time to review the situation or even to think it through. Usually, of course, new information and reevaluation are not enough to make us give up our intentions: they only call them in question. We now know more, but this makes us more, not less uncertain. The latest reports do not arrive all at once: they merely trickle in. They continually impinge on our decisions, and our mind must be permanently armed, so to speak, to deal with them."

—Carl von Clausewitz
On War, Book One, Chapter Three¹

"All actions in war take place in an atmosphere of uncertainty, or the "fog of war." Uncertainty pervades battle in the form of unknowns about the enemy, about the environment, and even about the friendly situation. While we try to reduce these unknowns by gathering information, we must realize that we cannot eliminate them—or even come close. The very nature of war makes certainty impossible; all actions in war will be based on incomplete, inaccurate, or even contradictory information."

—Warfighting MCDP 1²

"Though we try to reduce uncertainty by providing information, there will always be some knowledge that we lack. We will be aware of some of the gaps in our knowledge, but we will not even be aware of other unknowns. We must understand the forces that guarantee uncertainty and resolve to act despite it on the basis of what we do know."

—Command and Control MCDP 6³

Introduction

Carl von Clausewitz's *On War* has been characterized as the most meaningful endeavor to understand war in Western history.⁴ His ideas provide an intellectual foundation regarding warfare that have heavily influenced, if not transformed altogether, the doctrine and approach to thinking about warfare for the United States military and many other nations' armed forces. While critics and theorists argue over the meaning and application of Clausewitz's *On War*, the fact remains that his ideas provide a wealth of insights into the nature and conduct of war. Although much of *On War* is very theoretical and requires serious study with reflection, Clausewitz provided so much thoughtful material that both military professionals and civilians can benefit from his insights.

One of the most relevant areas of study for the military professional is found in Book One, Chapter Three, which focuses on the concept of "military genius."⁵ Clausewitz makes it clear that the title of military genius is reserved for the most senior military commanders, but his analysis of the qualities required for military decision-makers is no less relevant for both junior and senior leaders.⁶ The reason that military commanders and planners can benefit from a topical study of Clausewitz's ideas about military genius is this: it relates to the essence of what military professionals do every single day throughout their military careers—make decisions. Some decisions are made under little duress, while others are made on the battlefield where the result of poor decisions often result in the unnecessary loss of life, mission failure, or defeat in a given war.

In his explanation of military genius, Clausewitz focuses on the interplay between chance, uncertainty, and fear in their interaction with the military commander's intellect, character, intuition, and temperament. Each of these is worthy of in-depth study, but this monograph seeks to examine more closely the role of intuition on decision making and its application for military

professionals. While Clausewitz advances a very thorough analysis of the role of intuition related to the key aspects of decision making, advances in science and psychology since Clausewitz wrote *On War* provide a more complete understanding of how human beings make decisions and render judgments. Within the context of Clausewitz's study of intuition, cognitive psychologists and behavioral scientists have discovered important advances in how the human mind works and processes information. What cognitive psychologists have discovered is how to explain through scientific study how intuition works and what cognitive biases hinder effective decision making. In light of these advances, this paper seeks to explore the limitations of human intuition and address how cognitive biases contribute to faulty decision making. This will be done with Clausewitz's explanation of military genius used as a reference point to ascertain what factors prevent military professionals from thinking clearly in evaluating information in making decisions.

Summary of Clausewitz "Military Genius." Clausewitz begins his analysis of the concept of military genius by emphasizing that restricting his discussion to "*genius* proper" or a "superlative degree of talent" lacks utility because it lacks measurable limits.⁷ Instead, he focuses on "all those gifts of mind and temperament that in combination bear on military activity."⁸ The first prerequisite, according to Clausewitz, is courage, which he separates in two forms: the first of which he calls a "*permanent condition*" and the second a feeling or emotion that may arise from ambition, patriotism, or enthusiasm.⁹ Next, he addresses the "powers of intellect," which, viewed in the context of the fog and uncertainty of war, calls for a "sensitive and discriminating judgment" and "a skilled intelligence to scent out the truth."¹⁰ Clausewitz emphasizes the need for a *strong* mind instead of a *brilliant* mind since the former combines skilled intuitive judgment with determination.¹¹ Closely related to the idea of a strong mind is *presence of mind*, which "precisely conveys the speed and immediacy of the help provided by the intellect" and allows one

to handle unexpected events.¹² Furthermore, a sense of self-confidence balanced with a measure of skepticism is necessary and affords one the conviction to pursue a chosen course of action.¹³

Clausewitz warns against the danger of being swept away by emotion and says, "strength of character does not consist solely in having powerful feelings, but in maintaining one's balance in spite of them."¹⁴ He adds that, "...most men of emotional strength and ability are therefore of powerful character as well."¹⁵ But, while strength of character is important, it can degenerate into obstinacy, which he explains is "not an intellectual defect" but instead is a "fault of temperament."¹⁶ Moving from character to specific skill, Clausewitz addresses the practical necessity of an imagination that allows one to construct mental images that combine "a sense of locality" with a quick and accurate understanding of terrain.¹⁷ This sense of imagination provides the impetus for memory, which is equally important for a military commander. After discussing the importance of a commander-in-chief's political astuteness, he shows that awareness of the truth is insufficient to spur action—what is needed is a "blend of brains and temperament which [is found in] the qualities of determination, firmness, staunchness, and strength of character."¹⁸ Clausewitz concludes his explanation of military genius by saying:

If we then ask what sort of mind is likeliest to display the qualities of a military genius, experience and observation will both tell us that it is the inquiring mind rather than the creative mind, the comprehensive rather than the specialized approach, the calm rather than the excitable head to which in war we could choose to entrust the fate of our brothers and children, and the safety and honor of our country.¹⁹

With a general understanding of Clausewitz's concept of "military genius," it is possible to investigate the cognitive illusions that hinder the powers of intellect, which are so vital to military leaders at all levels.

The Illusions that Hinder Decisions

The Illusion of Attention. Military professionals are required to make decisions based on what they see and their experience, to include training and education. Vision is the foremost sense through which information of the outside world is collected and transmitted to the brain for processing. The lance corporal infantryman traveling on a mounted patrol relies on his visual perceptions to warn him of indications of a buried improvised explosive device (IED). The pilot relies on his vision to check myriad instruments in flight and land the aircraft on a moving aircraft carrier at night. And, for example, the battalion commander assesses numerous screens in his combat operations center, verifying friendly positions, restricted fire areas, and his video downlinks of the battlespace before authorizing a strike on a enemy position with rocket artillery. These examples highlight a mere fraction of the ways military professionals rely on what they see when making split-second life-and-death decisions. The ability to observe, collect information, process it, and make decisions is critical for military professionals at all ranks. However, cognitive scientists have demonstrated that human visual perception is highly susceptible to missing key aspects of a situation because of the *illusion of attention*.

In 1999 at Harvard University, cognitive psychologists Daniel Simons and Christopher Chabris conducted what is now the most widely-publicized study of inattention blindness by using a short film of two teams of people moving around and passing basketballs. One of the teams wore white shirts, and the other wore black. After the video was completed and edited, the psychologists solicited volunteers to watch the film and silently count the number of passes made by the players wearing white while ignoring any passes made by the players wearing black. After watching the video, the psychologists asked the volunteers how many passes they had counted. The researchers counted the correct answer to be thirty-four (or possibly thirty-five passes), but

the right number was largely irrelevant. The pass-counting was only intended to keep the volunteers engaged in doing something that demanded attention to the action on the screen. The real reason for the experiment was actually to determine how many of the participants would notice a female student wearing a full-body gorilla suit who walked in the scene, stopped in the middle of the players, turned towards the camera, thumped her chest, and then exited—after spending about nine seconds onscreen. The experimenters, after asking the volunteers about the number of passes, then asked if the viewers noticed anything unusual in the scene. Then, they asked if they noticed anyone other than the players, and they concluded by asking specifically if anyone noticed the gorilla. Surprisingly, about half of the volunteers did not notice the woman dressed as a gorilla. Since the original experiment was conducted, it has been repeated numerous times, with diverse audiences, in different countries, and under different conditions. In these, about half the people watching have consistently failed to see the gorilla.²⁰

What Chabris and Simons emphasize is not only that the relationship between one's visual field and perception is significantly influenced by attention, but that people are so surprised by the fact they had missed seeing the gorilla. Many viewing the film even claimed that the tape had been switched after seeing it for the first time. Chabris and Simons refer to this phenomenon as the *illusion of attention*; by this, they mean that humans "experience far less of our visual world than we think we do. If people were fully aware of the limits to attention, the illusion would vanish."²¹ This concept is particularly important for military leaders in war. Clausewitz knew this and commented, "Things are perceived, of course, partly by the naked eye and partly by the mind, which fills the gaps with guesswork based on learning and experience, and thus constructs a whole out of the fragments that the eye can see..."²² The implications are significant: knowing that the information gathered through visual perception is less reliable than humans believe it is

may lead to a fundamentally flawed understanding of a given situation before a commander makes an assessment and decides on appropriate actions.

The Illusion of Memory. In his list of qualities that capture the essence of military genius, Clausewitz addresses the importance of memory. As he commented, "We also admit that a good memory can be a great help; but are we then to think of memory as a separate gift of the mind, or does imagination, after all, imprint those pictures in the mind more clearly? The question must be left unanswered, especially since it seems difficult to conceive of these two forces operating separately."²³ Since Clausewitz wrote *On War*, scientists and psychologists have discovered far more about how memory works than was known in the 18th and 19th centuries. While this understanding has not produced any substantive improvements in how *well* humans can remember, it does shed light on the abilities and limitations of human memory. Naturally, this topic is particularly relevant for military professionals who rely on their memories linked to experience, training, and education to make life-or-death decisions.

Chabris and Simons argue that memory can be just as unreliable as visual perception. Their story recounting the events of President George W. Bush finding out about the terrorists attacks on the morning of 9/11 offers a significant example of how memory distortions can plague leaders during vivid and emotional situations. Most Americans recall seeing the video footage of President Bush reading to an elementary school class that morning when his chief of staff, Andrew Card, walked in and whispered to him that a second plane had hit the second tower of the World Trade Center. This was the moment when he realized that the United States was under attack. Aware before entering the classroom that the first plane had hit the World Trade Center, President Bush believed that the crash had been a small plane that had accidentally veered off course. However, on two later occasions, Bush publically recalled having seen the first plane

strike the tower before entering the classroom that morning.²⁴ Although reasonable to believe, Bush's memory on this event proved to be incorrect since the only video footage of the first plane impacting the World Trade Center became available six months after the attack. His other details in retelling the accounts of that morning were correct, but his memory of when and how he first learned of the attacks confused parts of the story in a conceivable but erroneous manner. This conflation of his memory on the attacks of the first and second planes is an example of what Chabris and Simons identify as the *illusion of memory*.²⁵

Psychologists have conducted numerous other studies that demonstrate the same faults in memory that President Bush experienced. One day after the space shuttle *Challenger* exploded, psychologists Ulric Neisser and Nicole Harsch asked a class at Emory University to recount how they heard about the explosion and answer a detailed set of questions which included how they heard about it and what they were doing at the time. Then, two and half years later, Neisser and Harsch asked the same students to complete a similar questionnaire about the event once again. The students provided plausible elements of their recollections of the experience, but the memories the students reported had changed significantly over time. In spite of the numerous memory errors contained in responses on the second questionnaire, the students were extremely confident in the accuracy of their memories years after the event. Following the experiment, Neisser and Harsch returned the original questionnaires completed one day following the *Challenger* explosion, and many of the students were amazed at the discrepancies between their original reports and the subsequent memories of the event. And a most pertinent point also emerged: "when confronted with their original reports, rather than suddenly realizing they had misremembered, they often persisted in believing their current 'memory.'"²⁶

The *illusion of memory*, as described by Chabris and Simons, essentially demonstrates that the way humans think about memory is not actually how it works. They argue that our intuitive beliefs about everyday memory failures is fairly accurate; humans tend to recognize that forgetting a person's name shortly after meeting is common, and misplacing one's car keys is a frequent occurrence. However, our intuitions about the persistence and accuracy of memory are different altogether.²⁷ The *illusion of memory* does not address Clausewitz's question about whether or not memory and imagination are forces incapable of operating separately. However, the concept does suggest that while a strong imagination may generate vivid images that facilitate memory, the mind is prone to distortions, regardless of how vivid and (seemingly) memorable an experience is at the time in which it occurs. The importance of this concept for military professionals is in understanding that while the mind is capable of remembering a vast amount of information, it is incapable of consistently and reliably capturing all the details of an event and is subject to distortions that are not readily apparent, especially as time passes. While some humans are inherently better at remembering information or events than others, no one is exempt from the *illusion of memory*. The general result is distortion of key details or reconstructed memories even when the mind believes that it has accurately captured all the relevant information.

The Illusion of Confidence. In explaining the desirable qualities of a military commander, Clausewitz speaks directly to the importance of balance and judgment. Specifically, he says that, "Often there is a gap between principles and actual events that cannot always be bridged by a succession of logical deductions. Then, a measure of self-confidence is needed, and a degree of skepticism is also salutary."²⁸ In essence, strength of character is formed by holding to convictions in the face of doubt; however, he warns against becoming obstinate, which he attributes to a "fault of temperament" rather than an "intellectual defect."²⁹ The two extremes of confidence are particularly dangerous; a complete lack of confidence inhibits one from making

decisions, whereas extreme overconfidence results in one making decisions with an unhealthy belief in his or her own abilities. Chabris and Simons label this cognitive effect as the *illusion of confidence*, which has two distinct but related aspects. First, it leads to people overestimating their own abilities, especially relative to others. Secondly, it causes people to interpret the confidence (or lack thereof) of others as a reliable indicator of their own abilities or knowledge.³⁰

Chabris and Simons conducted an experiment to determine just how overconfident people are in their own abilities. To do this, they surveyed chess players at two major tournaments—the World Open in Philadelphia and the U.S. Amateur Team Championship in New Jersey. They chose to survey chess players because each player has a mathematically objective rating based on a system that is highly accurate and uses up-to-date and precise numerical information that shows each player's "strength" (or ability) relative to other competitors. A comparison between two players' ratings provides the odds that one will defeat the other.³¹ The statistical rating system is a very objective measure of skill and is a "nearly perfect" indicator of one's ability.³² In the Chabris and Simons experiment, they asked the chess players to complete a short questionnaire of only two simple questions: "What is your most recent official chess rating?" and "What do you think your rating should be to reflect your true current strength?" Of those surveyed, half knew their rating exactly while the rest were off by only a few points (a very minor variation on the scale). Because the players knew their ratings, Chabris and Simons postulated that they should be able to correctly answer the second question about how they *should* be rated, with the correct answer being the same number provided in the first and second questions. However, only 21% of the players surveyed indicated that they thought their current rating was accurate. Around 4% thought that their ranking was too high, but the remaining 75% felt that they had been underrated. In essence, the vast majority were unjustifiably overconfident in their own skill level, to the point where the average player thought he was underrated by 99 points (or a two-to-one margin for

victory against an opponent with the same actual ranking). This cognitive effect, the *illusion of confidence*, illustrates that people tend to vastly overestimate their own skill levels despite direct or concrete evidence to the contrary.³³ While playing chess and fighting wars are vastly different endeavors, numerous historical examples indicate that the *illusion of confidence* is just as prevalent among statesmen and military leaders as it is with chess players who *should* know precisely how skilled they are.

In August 2008, the leadership of the nation of Georgia demonstrated that overconfidence can lead a country to war when they launched a major invasion into Russia. Georgia's plan was to quickly seize key areas in South Ossetia and Abkhazi, yet the Georgian army was defeated in less than a week of fighting. Chabris and Simon argue that "the Georgians were woefully overconfident in provoking war with the second-strongest military power in the world."³⁴ They further assert that the young president of Georgia, Mikheil Saakashvilli, who was elected in 2004 at the age of thirty-six, had appointed loyal ministers who were also young and lacked any military experience. And yet, over several years, they mutually convinced themselves that reclaiming regions from Russia was possible, in spite of the fact that the Georgian army was outnumbered twenty-five to one.³⁵

Dominic Johnson and Dominic Tierney offer a unique perspective on overconfidence in war that they label the "Rubicon theory of war."³⁶ Their theory references the actions in 49 B.C. of Julius Caesar as he approached the banks of the Rubicon River, halted his army, and paused momentarily before crossing and heading towards Rome. In violation of an ancient Roman law that prohibited any general from crossing the Rubicon, Caesar's decision, reflected in the phrase "*Alae iacta est* (The die has been cast)" made civil war inevitable.³⁷ With this historical reference, they argue that, "When people believe they have crossed a psychological Rubicon and

perceive war to be imminent, they switch from what psychologists call a '*deliberative*' to an '*implemental*' *mind-set*, triggering a number of psychological biases, most notably overconfidence.³⁸ To support their claim, they illustrate how both leaders in France and Britain were very pessimistic regarding their chances of defeating Germany as war in 1939 became a distinct possibility. In fact, French Prime Minister Edouard Daladier believed that "France could not fight" and that the "French air force was terrible."³⁹ However, according to Johnson and Tierney, leaders in France and Britain radically changed their outlooks from pessimism to an optimistic mindset without any substantive changes in their capabilities. According to their theory, French and British leaders had changed positions because of their psychological crossing of the Rubicon when war with Germany became unavoidable. Although this psychological effect is different from Chabris and Simons' *illusion of confidence*, the effect is still related as it shows how unwarranted military and political leaders' confidence often becomes when conflict seems imminent.

The highly-controversial decision leading to the invasion of Iraq in 2003 is often described as a significant example of how overconfidence in the beliefs of others can lead to war. Chabris and Simon relay Bob Woodward's account of George Tenet advising President George W. Bush prior to the invasion in late 2002 on the likelihood that Saddam Hussein possessed weapons of mass destruction. According to Woodward, Bush asked Tenet about the unconventional weapons, and Tenet responded, "It's a slam dunk case!" Bush repeated, 'George, how confident are you? Tenet's reply: 'Don't worry, it's a slam dunk!'"⁴⁰ Even weeks into the war, Ari Fleischer still publicly stated that he had high confidence that the weapons of mass destruction would be found.⁴¹ Nine years of war in Iraq proved that this was simply not the case.

Beyond the faulty intelligence estimates that served partially as justification to invade Iraq in 2003, author Dominic Johnson points out that Secretary of Defense Donald Rumsfeld's

overconfidence in the planning for the invasion of Iraq resulted in serious miscalculations regarding the appropriate size of the invasion force.⁴² According to Michael Gordon and General Bernard Trainor, General Anthony Zinni had developed CENTCOM's OPLAN 1003-98, which was devised as a strategy for responding to a potential collapse of the Iraqi Regime under Saddam Hussein. The plan called for between 380,000 to 400,000 troops and indicated that the occupation could last up to ten years.⁴³ However, Rumsfeld appears to have been overconfident in his own intuitions and dismissed the military planners' troop requirements as "legacy thinking."⁴⁴ Had Rumsfeld not compromised from his original beliefs, the invasion could have been conducted by a much smaller force of 75,000 instead of the 400,000 that military planners had originally deemed necessary.⁴⁵ One could argue that Rumsfeld was not overconfident in his beliefs but instead that he could not have foreseen the problems coalition forces experienced when L. Paul Bremer decided to dismantle the Iraqi army and dissolve the Baath party.⁴⁶ However, this appears to be a rather myopic view of the likely outcome once coalition forces reached Baghdad and defeated Saddam's army. Daniel Kahneman's observation about confidence appears to be a better explanation for the underlying cognitive bias that guided Rumsfeld's beliefs: "Confidence is a feeling, one determined mostly by the coherence of the story and by the ease with which it comes to mind, even when the evidence for the story is sparse and unreliable....An individual who expresses high confidence probably has a good story, which may or may not be true."⁴⁷

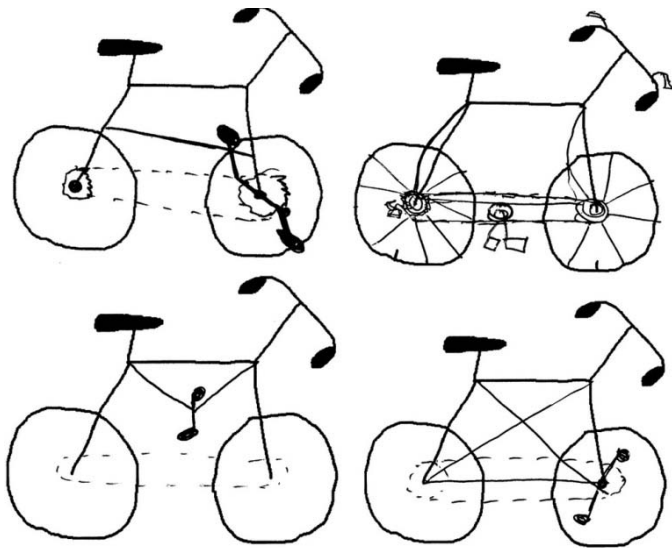
Chabris and Simon's observation that incompetence and overconfidence are linked is counterintuitive. From a rationale perspective, it would seem that those who are the *most unskilled* would also be the *least confident*. However, they point out that cognitive scientists have concluded that this is not the case; in fact, the best way to make people better judges of their own competence is to increase their skill levels. As a result, when a person's confidence increases as he becomes more proficient at a skill or discipline, he is less likely to be *overconfident* in his

abilities."⁴⁸ Given this insight, commanders should be suspicious of the advice or behavior of their subordinates who are overconfident in their abilities since this is a prime indicator that those individuals are actually the least skilled.⁴⁹ Additionally, because confidence is also a personality trait, comprehending this is important because it means that people have varying baselines of confidence. A commander can easily judge the level of confidence of his staff or subordinate commanders on a given matter if he understands how confident they typically are. However, he must be cognizant that basing decisions on the confidence displayed by someone with whom he is not familiar involves a higher degree of risk. Alternatively, while overconfidence is more prevalent (and often more dangerous) than under confidence, a smaller percentage of people portray under confidence even though they possess a high level of skill.⁵⁰

The Illusion of Knowledge. In his chapter dealing with "military genius," Clausewitz devotes considerable attention to the intellectual abilities required not only for the most senior commanders, but also for military professionals in general. He wrote, "If we pursue the demands that war makes on those who practice it, we come to the region dominated by the *powers of intellect*. War is the realm of uncertainty...A sensitive and discriminating judgment is called for; a skilled intelligence to scent out the truth."⁵¹ To be clear, knowledge and intelligence are not the only qualities necessary for military professionals, but they are important. Clausewitz speaks directly to the importance of a "strong [mind] rather than a brilliant one."⁵² The commander who possesses a strong mind, according to Clausewitz, is one who has discriminating intuitive judgment, intellect, and the courage to not only accept responsibility but also the determination to make decisions in uncertain situations.⁵³ The problem, according to Chabris and Simon, is that people are susceptible to thinking they know more than they actually do. They describe this as the *illusion of knowledge*.⁵⁴

The first element of the *illusion of knowledge* is that people tend to associate familiarity with everyday objects for a deeper understanding of how they work. British psychologist Rebecca Lawson conducted an experiment with more than 200 people demonstrating this concept in a very simple, but striking way. She asked the participants to think about a bicycle and rate their understanding of how it works. To gauge their responses, she used a numerical scale

Figure 1: Sample bicycle drawings⁴²



ranging from 1 to 7, where a 1 indicated "no understanding" and a 7 indicated "complete understanding." On average, her subjects rated their understanding at 4.5 out of 7. Additionally, she had the subjects sketch a bicycle, which was the most telling part of the study. More than 97% knew how to ride a bike, but the illustrations demonstrated how little people actually understood about how a bicycle actually

functioned. Many had drawn the frame joining the front and front wheels, which would make steering impossible. Many respondents also did not place the pedals between the wheels and inside the chain. Some of the illustrations had the pedals attached to the front wheel or the back wheel. Among the other errors, many were also significant misrepresentations of the functional requirements of a bike.⁵⁶ While the ability to accurately depict how and why a bicycle works is not relevant to military professionals, the importance of this example should not be discounted; if people have significant gaps of knowledge in familiar and simple mechanical objects such as bicycles, there is a strong likelihood that military planners and commanders have similar knowledge gaps in far more complex domains—without even being aware of the prevalence of significant knowledge gaps.

As Chabris and Simons concluded, "The illusion of knowledge makes us think we know how common objects work when we really don't, but it is even more influential and consequential when we reason about complex systems. Unlike a toilet or bicycle, a complex system has many more interacting parts, and the system's overall behavior cannot be easily determined just by knowing how its individual parts behave."⁵⁷ An excellent recent example illustrating the illusion of knowledge is the 2007 housing collapse in the United States, specifically in the subprime mortgage collapse. Although there were numerous causes for this financial crisis, much of the problem hinged on bond-rating agencies using flawed statistical models to evaluate the level of risk for collateralized debt obligations (CDOs). Even in 2007, Moody's still used a model that relied upon data from prior to 2002—well before the era when vast numbers of people began purchasing unaffordable homes relative to their personal financial situations. Only after the housing bubble burst did it become apparent how flawed the models were that companies and their decision makers used to evaluate risk.⁵⁸ While this example is drawn from a completely different domain than the military, the underlying cognitive illusion is no less common for military professionals.

The Illusion of Cause. Although Clausewitz predates the psychological effect known as the *illusion of cause*, he articulates the premise in saying:

Even so, the disparity between cause and effect may be such that the critic is not justified in considering the effects as inevitable results of known causes. This is bound to produce gaps—historical results that yield no useful lesson. All a theory demands is that investigation should be resolutely carried on till such a gap is reached. As that point, judgment has to be suspended. Serious trouble arises only when known facts are forcibly stretched to explain effects; for this confers on these facts a spurious importance.⁵⁹

Clausewitz also addresses the role of intuition in decision making this way, "The man responsible for evaluating the whole must bring to his task the quality of intuition that perceives the truth at

every point. Otherwise a chaos of opinions and considerations would arise, and fatally entangle judgment." He continues, "What this task requires...is a sense of unity and a power of judgment raised to a marvelous pitch of wisdom, which easily grasps and dismisses a thousand remote possibilities which an ordinary mind would labor to identify and wear itself out in so doing."⁶⁰ Here, Clausewitz speaks directly to the importance of discernment in evaluating a situation and potential options. One of the primary reasons military professionals fail to understand problems they face is misunderstanding how cognitive errors influence evaluation of cause-and-effect. Chabris and Simon explain it in this way, "...our understanding of our world is systematically biased to perceive meaning rather than randomness and to infer cause rather than coincidence. And we are usually completely unaware of these biases."⁶¹ Assuming their analysis is correct, it is important to understand how and why this *illusion of cause* occurs. In so doing, military professionals must strive to improve their abilities to think critically and accurately, especially when human lives and mission accomplishment are at stake.

One of the most well-known psychological experiments illustrating this cognitive effect was conducted by a medical doctor, Donald Redelmeier, and a cognitive psychologist, Amos Tversky. Their experiment focused on the common belief that the weather affected the level of pain experienced by those suffering from arthritis. In fact, medical textbooks have devoted entire chapters to this erroneous relationship. Redelmeier and Tversky tested their hypothesis by tracking 18 patients suffering from arthritis over 15 months and had them rate their level of pain twice each month. They subsequently matched the data collected with weather reports over the same period. With only one exception, each patient believed that changes in weather had an effect on his pain levels. However, when Redelmeier and Tversky charted the reports of pain and compared it to the weather on the days reported and the preceding two days, they found that no association existed.⁶²

To further study what would lead arthritis sufferers to believe that a correlation existed with the weather, Redelmeier and Tversky conducted another experiment with undergraduate students. They provided them with two numbers: one being a patient's level of pain and the other the barometric pressure for that day. In spite of there being no actual correlation between the two sets of numbers, more than half of the undergraduate students believed that a correlation existed between the two; in fact, 87% interpreted a positive relationship in one case. The reason for these results as Chabris and Simons explained the reason for these results, "The subjects and the patients perceived an association where none existed because they interpreted the weather and pain data in a way that was consistent with their preexisting beliefs."⁶³

Little imagination is required to think of how the *illusion of cause* might affect a military commander. As a hypothetical example, a Marine commander in Afghanistan commands both a Marine regiment assigned and an Army brigade, each with its own assigned battlespace. The Marine commander has a preconceived belief that Marine units are more disciplined and effective at fighting in a counterinsurgency based on his limited personal experiences. In his daily commander's update brief, his G-3 reports over the course of two months that the Marine regiment has twice the number of reported hostile engagements than the Army brigade. The commander is also told of increased civil-military partnership efforts by the army brigade, but he dismisses the positive reports based on his preconceived notion that the army is generally less aggressive and is merely avoiding more dangerous parts in the area of operations. Relying on the reports of hostile incidents and numbers of enemy killed in action, the Marine commander erroneously believes that the Marine regiment is having more success in executing the unit's counterinsurgency mission. In this example, the Marine commander is suffering from the *illusion of cause*. His own analysis of the Marine regiment's "success" compared to the army's is made to fit his cognitive biases, when in fact the patterns he perceives merely reinforce his preconceived notions—ignoring the fact that

the number of hostile engagements has no bearing on which unit is having more success in the counterinsurgency efforts.

The U.S. Army's strategy in the Vietnam War is a powerful example of the *illusion of cause* and its devastating effect on how military leaders' biases influenced their thinking. In *The Army and Vietnam*, author Andrew Krepinevich argues that the U.S. Army's patterns of success in conventional conflicts prior to Vietnam reinforced its leaders' beliefs that the "Army Concept" of using conventional forces and massive firepower would prevail against the North Vietnamese Army and the Viet Cong.⁶⁴ This flawed model was echoed in General Westmoreland's answer to a question at a press conference about defeating an insurgency with his one-word response: "Firepower."⁶⁵ In adopting a strategy of attrition through the lens of prior conflicts, the Army "ended up trying to fight the kind of conventional war it was trained, organized, and prepared...to fight instead of the counterinsurgency war it was sent to fight."⁶⁶ Accordingly, the focus on body counts resulted in the U.S. Army believing that destruction of the enemy was the top priority instead of protecting the population.⁶⁷ Naturally, the *illusion of cause* is not the only contributing factor to the United States' failure in the Vietnam War, but it is clear that it did heavily influence the military's flawed strategy.

Summary of Cognitive Illusions. Although the cognitive illusions addressed in this paper only represent a fraction of the psychological biases people routinely experience, understanding their causes and implications is paramount for all military professionals, and especially for those senior military commanders whose decisions have such profound significance. In summary, the *illusion of attention* shows that humans actually perceive far less of the visual world than they believe they do. If they were cognizant of the limits to attention, this illusion would not persist. The *illusion of memory* shows that the way people think about memory is not actually how it works.

What one remembers can differ significantly from what actually happened, and stored memories are not a true representation of actual events. The *illusion of confidence* illustrates that confidence is not a good indicator of ability, and people tend to vastly overestimate their own capabilities until they become truly proficient within a given domain. The *illusion of knowledge* shows that people are prone to thinking they know more than they actually do. It also causes people to associate familiarity with everyday objects for a deeper understanding of how they work, even though this belief is almost always wrong. This phenomenon is even more pronounced in trying to comprehend complex systems that have numerous interactive parts. The *illusion of cause* shows that although pattern recognition is a vital cognitive ability that allows human to draw conclusions rapidly based on previous observations, humans are prone to perceive patterns even when they do not exist. And, perceiving meaning out of coincidence and randomness may translate flawed assumptions into inappropriate decisions.

Understanding How Decisions Are Made

One of the most important aspects Clausewitz addresses in his discussion of the characteristics required of a military genius is the ability for a commander to rapidly make appropriate and timely decisions in uncertain situations. He uses the French phrase *coup d'oeil*, which he says "refers not only to the physical but, more commonly, to the inward eye."⁶⁸ He adds, "Stripped of metaphor and of the restrictions imposed on it by the phrase, the concept merely refers to the quick recognition of a truth that the mind would ordinarily miss or would perceive only after long study and reflection."⁶⁹ Essentially, expert intuition enables the commander to make the best decision in the difficult circumstances. For this reason, historian Jon Sumida states that, according to Clausewitz, "the primary objective of officer education should be

the enhancement of intelligent intuition. And...the only effective means of doing so during peace is to have officers replicate the experience of decision making by a commander in chief through historical reenactment of command decisions and reflect on that replicated experience."⁷⁰

Although a reasonable approach and certainly not without merit, one must understand how decisions are made before rendering judgment on the effectiveness of this approach.

The Two Systems of Thought. Widely-respected psychologist Daniel Kahneman offers a view that illustrates not only how people make decisions, but his research calls into question the extent to which one can develop the kind of intuition Clausewitz advances in his concept of military genius. In *Thinking, Fast and Slow*, Kahneman expands on the work of Keith Stanovich, Richard West, and other psychologists in exploring the theory that thought has two distinct systems, which Kahneman describes using a metaphor of *agents*.⁷¹ While other psychologists routinely use the dual-system mental model, Kahneman extends the notion by personifying it as "a psychodrama with two characters."⁷² At a basic level, System 1 is characterized by the fast and intuitive, whereas System 2 is deliberate and effortful.⁷³ System 1, which handles most of human thought, may be thought of as the "hero of the book." Kahneman asserts that, "the automatic operations of System 1 generate surprisingly complex patterns of ideas, but only the slower System 2 can construct thoughts in a orderly series of steps."⁷⁴ As such, System 1 sorts through feelings and memories and then makes suggestions to System 2, which makes the decision. Kahneman relates that "the main function of System 1 is to maintain and update a model of your personal world, which represents what is normal."⁷⁵ This division of labor between the two systems is very efficient because it "minimizes effort and optimizes performance."⁷⁶ System 1, although fairly reliable at making short-term predictions, is prone to systematic errors, biases, and cognitive illusions (such as those previously covered in this paper) that are undetectable by System 2. A limitation of System 1 is that it is constantly functioning and "cannot be turned off."⁷⁷ Because

System 2 is slow and requires more mental effort and time in sorting through decisions, the two systems make compromises that often result in flawed decisions.

According to Kahneman, "The measure of success for System 1 is the coherence of the story it manages to create. The amount and quality of the data on which the story is based is largely irrelevant. When information is scarce, System 1 operates as a machine for jumping to conclusions."⁷⁸ Because System 1 seeks coherence and System 2 is "lazy," System 2 tends to endorse intuitive beliefs that "closely reflect the impressions generated by System 1."⁷⁹

Kahneman uses that abbreviation "WYSIATI," which stands for "what you see is all there is" to represent this concept and says: "WYSIATI facilitates the achievement of coherence and of the cognitive ease that causes us to accept a statement as true. It explains why we can think fast, and how we are able to make sense of partial information in a complex world. Much of the time, the coherent story we put together is close enough to reality to support reasonable action."⁸⁰

This represents the basis for intuition, but it also helps to explain the cognitive illusions previously explored along with other biases beyond those explained by Chabris and Simons. The impact of this concept is not foreign to the military; in fact, Daniel Breitenbach's analysis of the operational deception plan for Operation Desert Storm illustrates the coalition's effectiveness of capitalizing on cognitive errors to rapidly defeat Saddam Hussein's army. In his paper, Breitenbach compares the deception plan with the Central Intelligence Agency's Deception Research Programs maxims, which illustrate how military planners can *exploit* cognitive biases and faulty intuition as a method for defeating an adversary.⁸¹ Thus, understanding cognitive illusions and biases is not only important in guarding against making poor decisions, but this knowledge may be used to great effect in amplifying the inherent confusion and friction an enemy experiences.

The Limits of Intuition. Michael Handel in *Masters of War: Classical Strategic Thought* offers criticism of Clausewitz's concept of military genius because, "The most potentially damaging consequence of Clausewitz's reliance on the intuition of the military genius is that, if carried to extremes, it weakens one's incentives to gather the best possible intelligence and replaces the systematic search for information with intuition alone."⁸² While Handel's conclusion is plausible, it seems to only partially recognize the inherent limitations of intuition. Although some have championed the merits of intuition such as Malcolm Gladwell, author of the bestseller *Blink*, Daniel Kahneman is far more skeptical of the reliability of intuition and presents a compelling argument against this view.⁸³ Gladwell's analysis of intuition echoes Clausewitz's views on intuition in his explanation of the concept of military genius. Alternatively, Daniel Kahneman collaborated with research psychologist Gary Klein and concluded that intuition is actually recognition, which is a function of memory.⁸⁴ While they agree on this point, Kahneman differs from Klein in their attempt to answer the question, "When can you trust a self-confident professional who claims to have an intuition?"⁸⁵

After a lengthy debate, they generally agreed that intuitions are likely to be skilled when two conditions are met: the first is in "an environment that is sufficiently regular to be predictable" and second is when one has "an opportunity to learn these regularities through prolonged practice."⁸⁶ One example Kahneman uses is that of chess players who develop expertise within this domain. He points out that an expert chess player can understand a complex position with a brief glance at the board. Studies of chess masters who have this level of skill have shown that it requires at least 10,000 hours of devoted practice (or approximately six years of playing five hours a day) to achieve the highest performance levels.⁸⁷ In spite of all the possible game-play possibilities, the game of chess is an example of a regular environment. Kahneman contrasts this environment to that in which political scientists and stock pickers

operate—or what he calls a "zero-validity environment."⁸⁸ War, an environment of exponentially more chaos and unpredictability, might aptly be described as the ultimate zero-validity environment. Accordingly, Kahneman's conclusion calls into question the extent to which one can develop the kind of intuition described in Clausewitz's concept of military genius.

Daniel Kahneman's perspective on the limits of intuition, which military professionals might interpret with a degree of pessimism, is actually rather constructive. For an infantryman, simply knowing the maximum effective range of a given weapon system is one of the first prerequisites for employment. Instead of dwelling on a limitation such as range, knowledge of the limits is actually *empowering*. Ignorance of limitations precludes successful usage of a tool—regardless of whether it is a rifle or one's own mind. This analogy, applied to an understanding of the limits of intuition, is even more beneficial. If a military commander is aware of the limits of intuition, he or she is already far better prepared for conflict against an enemy who is unaware of this limitation. Realizing that intuition is a function of memory and is far less useful in unpredictable environments that never truly replicate previous situations suggests that intuition should not replace a thorough and comprehensive analysis of a situation. This view *does not dismiss* the value of studying history or conducting hypothetical decision games. Rather, it provides military professionals a comparative framework of likely scenarios against a historical reference point in which one can examine previous leaders' assumptions, beliefs, decisions, and ultimate outcomes. A thoughtful analysis of history and having vicarious experiences, combined with an understanding that intuitions are often misleading, offers military professionals a better perspective and cognitive awareness that may help prepare them to handle uncertainties faced in war.

Conclusion

Carl von Clausewitz's concept of "military genius" is an extremely insightful and relevant analysis of the desirable qualities for senior commanders. But, his explanation of the cognitive abilities required of decision makers is subject to misinterpretation, particularly the idea of *coup d'oeil*. An ability to rapidly and effectively evaluate a situation before making sound decisions in an inherently chaotic and unpredictable environment is a worthwhile goal. A strategic intuition that allows a commander, in Clausewitz's words, to "easily grasp and dismiss a thousand remote possibilities" and "perceive the truth at every point" appears to be more of a "logical fantasy" akin to Clausewitz's explanation of "absolute war" (as compared to "real war").⁸⁹ This analogy does not suggest that military commanders are incapable of processing vast amounts of information and successfully making decisions in war. Rather, it reflects an element of skepticism regarding the possibility of a commander's ability to perceive *the* truth at *every* point.

The research of cognitive psychologists like Chabris, Simons, and Kahneman urges caution when considering the possibilities of human intuition and cognitive decision-making abilities. Their analysis suggests that cognitive illusions and biases are not inherently bad. But, they might be viewed appropriately as necessary evils or byproducts of the cognitive abilities that facilitate the accomplishment of complex mental processes such as focusing, remembering, evaluating consequences, and rendering judgments. The problem, thus, is not that these mental limitations exist—instead, the danger humans confront is when these illusions and biases go unnoticed. As a result, people unconsciously make decisions and act without fully realizing the inherent limitations in their own cognitive abilities. Chabris and Simons are direct and unabashed in their conclusion:

What we intuitively accept and believe is derived from what we collectively assume and understand, and intuition influences our decisions

automatically and without reflection. Intuition tells us that we pay attention to more than we do, that our memories are more detailed and robust than they are, that confident people are competent people, that we know more than we really do, the coincidences and correlations demonstrate causation, and that our brains have vast reserves of power that are easy to unlock. But in all these cases, our intuitions are wrong, and they can cost us...if we follow them blindly.⁹⁰

Clausewitz's warnings throughout his chapter on military genius appear to account for this in some measure. However, a more complete understanding of human psychology and cognitive biases and illusions should lead one to consider with a degree of skepticism Clausewitz's "comprehensive guide to action:"

Often there is a gap between principles and actual events that cannot always be bridged by a succession of logical deductions. Then, a measure of self-confidence is needed, and a degree of skepticism is also salutary. Frequently, nothing short of an imperative principle will suffice, which is not part of the immediate thought-process, but dominates it: that principle is in all doubtful cases *to stick to one's first opinion and to refuse to change unless forced to do so by a clear conviction.*⁹¹

Although cognitive psychologists have not provided evidence to refute the validity of this guide to action, they have provided sufficient warning against adamantly clinging to one's first opinion, since initial impressions are so often prone to error and misperception. There are circumstances when military commanders have little time to do anything else but act based on intuitions or initial impressions, but the most senior commanders seldom have to make split-second decisions. Commanders operating at the tactical level of war may find that time does not permit a thorough analysis of a situation before reaching a decision. But, Clausewitz largely focuses his attention on the operational level of war, an environment less frequently characterized by the need for instantaneous decisions. Accordingly, commanders at the operational level of war should avoid applying a tactical approach to decision making (i.e., with an emphasis on rapid decision making) when it is not clearly required because intuitive decisions are seldom an appropriate substitution for a more rigorous analytical approach.

In view of the evidence examined, perhaps Clausewitz's guide to action might well be revised to say, "in all doubtful cases to be *cautious of one's first opinions* and readily seek to challenge those beliefs and convictions that are formed subconsciously in a mental environment *clouded by biases and illusions*." The danger in this alternative view is that it could lead to unhealthy self-doubt and inaction—the kind that plagued Union General George McClellan in the Civil War. But, the alternative view is often equally or more devastating—just as Napoleon experienced in the Russian Campaign or General Robert E. Lee at Gettysburg.

ENDNOTES

- ¹ Carl von Clausewitz, *On War*, trans. Michael Howard and Peter Paret (Princeton: Princeton University Press, 1976/1984), 103.
- ² Headquarters U.S. Marine Corps, *Warfighting*, MCDP 1 (Washington, DC: U.S. Marine Corps, June 20, 1997), 7.
- ³ Headquarters U.S. Marine Corps, *Command and Control*, MCDP 6 (Washington, DC: U.S. Marine Corps, October 4, 1996), 55.
- ⁴ This characterization is paraphrased from the publishers remarks in Michael Howard's and Peter Paret's translation of Carl von Clausewitz's *On War*, rear cover.
- ⁵ Clausewitz, *On War*, 100.
- ⁶ Ibid, 111.
- ⁷ Ibid, 100.
- ⁸ Ibid, 100.
- ⁹ Ibid, 101.
- ¹⁰ Ibid, 101.
- ¹¹ Ibid, 102-103.
- ¹² Ibid, 104.
- ¹³ Ibid, 108.
- ¹⁴ Ibid, 107.
- ¹⁵ Ibid, 108.
- ¹⁶ Ibid, 108.
- ¹⁷ Ibid, 109.
- ¹⁸ Ibid, 112.
- ¹⁹ Ibid, 112.
- ²⁰ Christopher F. Chabris and Daniel J. Simons, *The Invisible Gorilla: And Other Ways Our Intuitions Deceive Us* (New York, NY: Crown, 2010), 5-6.
- ²¹ Ibid, 7.
- ²² Clausewitz, *On War*, 109.
- ²³ Ibid, 110.
- ²⁴ Chabris and Simons, *The Invisible Gorilla: And Other*, 71.
- ²⁵ Ibid, 72.
- ²⁶ Ibid, 73.
- ²⁷ Ibid, 45.
- ²⁸ Clausewitz, *On War*, 108.
- ²⁹ Ibid, 108.
- ³⁰ Chabris and Simons, *The Invisible Gorilla: And Other*, 85.
- ³¹ Christopher F. Chabris, "Cognitive and Neuropsychological Mechanisms of Expertise: Studies with Chess Masters" (PhD diss., Harvard University, 1999), 6.
- ³² Chabris and Simons, *The Invisible Gorilla: And Other*, 82-85. In the chess rating system, the numerical scores are set and adjusted over a long series of games. The example the authors provide shows that a player rated two hundred points above his opponent should score around 75 percent of the points. For a player who has a 400 point advantage over his opponent, he or she should statistically win almost every game.
- ³³ Ibid, 84-85.

- ³⁴ Ibid, 101-102.
- ³⁵ Ibid, 102.
- ³⁶ Dominic D.P. Johnson and Dominic Tierney, "The Rubicon Theory of War: How the Path to Conflict Reaches the Point of No Return." *International Security* 36, no. 1 (Summer 2011), 7.
- ³⁷ Ibid, 7.
- ³⁸ Ibid, 7.
- ³⁹ Ibid, 10.
- ⁴⁰ Chabris and Simons, *The Invisible Gorilla: And Other*, 95.
- ⁴¹ Ibid, 95.
- ⁴² Dominic D.P. Johnson, *Overconfidence and War: the Havoc and Glory of Positive Illusions* (Cambridge, Mass.: Harvard University Press, 2004), 216-217.
- ⁴³ Michael R. Gordon and Bernard E. Trainor, *COBRA II: The Inside Story of the Invasion and Occupation in Iraq* (New York: Pantheon Books, 2006), 26.
- ⁴⁴ Ibid, 53.
- ⁴⁵ Johnson, *Overconfidence and War*, 203.
- ⁴⁶ Gordon and Trainor, *COBRA II*, 494-495.
- ⁴⁷ Daniel Kahneman, "Don't Blink! The Hazards of Confidence," *The New York Times*, October 19, 2011, accessed February 26, 2013, http://www.nytimes.com/2011/10/23/magazine/dont-blink-the-hazards-of-confidence.html?pagewanted=all&_r=0.
- ⁴⁸ Chabris and Simons, *The Invisible Gorilla: And Other*, 107.
- ⁴⁹ Ibid, 90.
- ⁵⁰ Ibid, 92.
- ⁵¹ Clausewitz, *On War*, 101. Clausewitz goes on to say that, "Average intelligence may recognize the truth occasionally, and exceptional courage may now and then retrieve a blunder; but usually intellectual inadequacy will be shown up by indifferent achievement." He goes on to say on page 111, "Since in our view even junior positions of command require outstanding intellectual qualities for outstanding achievement, and since the standard rises with every step, it follows that we recognize the abilities that are needed if the second positions in an army are to be filled with distinction."
- ⁵² Ibid, 103.
- ⁵³ Ibid, 102-103.
- ⁵⁴ Chabris and Simons, *The Invisible Gorilla: And Other*, 119.
- ⁵⁵ Rebecca Lawson, "The Science of Cycology: Failures to Understand How Everyday Objects Work." *Memory & Cognition*, no. 34 (December 2006): 1667-75. The four bicycle illustrations are taken from an abbreviated version of Lawson's article available on the web (as of March 2013) here: <http://www.liv.ac.uk/~rlawson/cycleweb.html>.
- ⁵⁶ Ibid, 120.
- ⁵⁷ Ibid, 124.
- ⁵⁸ Chabris and Simons, *The Invisible Gorilla: And Other*, 131-132. In the subprime mortgage crisis, large banks and corporations backed by the U.S. Federal Government "...purchased mortgages and resold them in groups to other investors as mortgage-backed securities, which were themselves packaged together into the infamous collateralized debt obligations (CDOs).
- ⁵⁹ Clausewitz, *On War*, 156-157.
- ⁶⁰ Ibid, 112.
- ⁶¹ Chabris and Simons, *The Invisible Gorilla: And Other*, 154.

- ⁶² Ibid, 158-159.
- ⁶³ Ibid, 158.
- ⁶⁴ Andrew F. Krepinevich, Jr., *The Army and Vietnam* (Baltimore, MD: The Johns Hopkins University Press, 1986), 4-7.
- ⁶⁵ Ibid, 197.
- ⁶⁶ Ibid, 271.
- ⁶⁷ Ibid, 202.
- ⁶⁸ Clausewitz, *On War*, 102.
- ⁶⁹ Ibid, 102.
- ⁷⁰ Jon T. Sumida, "The Clausewitz Problem." *Army History* (Fall 2009), 18.
- ⁷¹ Daniel Kahneman, *Thinking, Fast and Slow* (New York, NY: Farrar, Straus and Giroux, 2011), 13.
- ⁷² Ibid, 21.
- ⁷³ Ibid, 24.
- ⁷⁴ Ibid, 21.
- ⁷⁵ Ibid, 71.
- ⁷⁶ Ibid, 25.
- ⁷⁷ Ibid, 25.
- ⁷⁸ Ibid, 85.
- ⁷⁹ Ibid, 86. Kahneman relates that the main characteristic of System 2 is laziness because the mind is reluctant to invest more effort than is strictly necessary.
- ⁸⁰ Ibid, 87.
- ⁸¹ Daniel L. Breitenbach. *Operation Desert Deception: Operational Deception in the Ground Campaign* (Newport, RI: Naval War College, 1992), 1-2, 9.
- ⁸² Michael I. Handel, *Masters of War: Classical Strategic Thought*, 3 ed. (New York: Routledge, 2000), 255-256.
- ⁸³ Kahneman, *Thinking, Fast and Slow*, 235.
- ⁸⁴ Ibid, 237.
- ⁸⁵ Ibid, 237.
- ⁸⁶ Ibid, 240.
- ⁸⁷ Ibid, 238.
- ⁸⁸ Ibid, 240.
- ⁸⁹ Clausewitz, *On War*, 113.
- ⁹⁰ Chabris and Simons, *The Invisible Gorilla: And Other*, 231.
- ⁹¹ Clausewitz, *On War*, 108.

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APPENDIX A: "MILITARY GENIUS" AND COGNITIVE ILLUSION MATRIX

Clausewitz Concept	Illusion Concept	Comment
"Things are perceived, of course, partly by the naked eye and partly by the mind, which fills the gaps with guesswork based on learning and experience, and thus constructs a whole out of the fragments that the eye can see..."	Attention	Humans experience far less of the visual world than they believe they do and suffer from inattentional blindness. People often see that which they expect to see, but they often miss that which is outside the realm of expectations or experience. If people were cognizant of the limits to attention, this illusion would not persist.
"We also admit that a good memory can be a great help; but are we then to think of memory as a separate gift of the mind, or does imagination, after all, imprint those pictures in the mind more clearly? The question must be left unanswered, especially since it seems difficult to conceive of these two forces operating separately."	Memory	The way humans think about memory is not actually how it works. What one remembers can differ significantly from what actually happened. Stored memories are not a true representation of actual events. The memories of vivid events are often distorted unknowingly, especially as time passes.
"Often there is a gap between principles and actual events that cannot always be bridged by a succession of logical deductions. Then, a measure of self-confidence is needed, and a degree of skepticism is also salutary."	Confidence	The confidence people exhibit in various situations is often an illusion. Those who possess minimal skill are often the most overconfident in their abilities. Because they are unaware that they are unskilled, they may be unlikely to take steps to improve. Confidence is not a good indicator of ability, and people tend to vastly overestimate their own capabilities until they become truly proficient within a given domain.

<p>"If we pursue the demands that war makes on those who practice it, we come to the region dominated by the <i>powers of intellect</i>. War is the realm of uncertainty...A sensitive and discriminating judgment is called for; a skilled intelligence to scent out the truth."</p>	<p>Knowledge</p>	<p>People are prone to thinking they know more than they actually do, and experts in a given field are not exempt from this illusion. The illusion of knowledge causes people to associate familiarity with everyday objects for a deeper understanding of how they work, even though this belief is almost always wrong. This phenomenon is even more pronounced in trying to comprehend complex systems that have numerous interactive parts.</p>
<p>"The man responsible for evaluating the whole must bring to his task the quality of intuition that perceived the truth at every point. Otherwise a chaos of opinions and considerations would arise, and fatally entangle judgment." Clausewitz continues, "What this task requires...is a sense of unity and a power of judgment raised to a marvelous pitch of wisdom, which easily grasps and dismisses a thousand remote possibilities which an ordinary mind would labor to identify and wear itself out in so doing."</p>	<p>Cause</p>	<p>Pattern recognition is a vital cognitive ability that allows human to draw conclusions rapidly based on previous observations. However, humans are prone to perceive patterns even when they do not exist. And, people are highly prone to perceive meaning out of coincidence and randomness, which can translate flawed assumptions into inappropriate decisions.</p>
<p>Summary comment:</p> <p>Clausewitz addressed many of the cognitive illusions that affect humans' thoughts, decisions, and actions without the benefit of recent psychological research. Although Clausewitz's concept of "military genius" is remarkably insightful and beneficial to military professionals, a deeper understanding of human cognition and its limitations provides a more comprehensive view of the complex interplay between perception, analysis, decision, and actions. Comparing Clausewitz's ideas with a scientific framework provides a greater level of understanding than was possible when he wrote <i>On War</i> without diminishing the relevancy and applicability of his observations and theories.</p>		